APNOR

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Determinants of Nursing Homes Performance: The Case of Portuguese Santas Casas da Misericórdia

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Dissertação apresentada ao Instituto Politécnico de Bragança para obtenção do Grau de Mestre em Contabilidade e Finanças

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Determinants in the Performance of Nursing Homes: The Case of Portuguese Santas Casas da Misericórdia

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Resumo

Este estudo tem como objetivo avaliar a eficiência económica de 96 lares de idosos pertencentes às entidades Santas Casas da Misericórdia (SCM) e os determinantes que influenciaram a sua eficiência em 2012 e 2013. As SCM são as entidades sem fins lucrativos, pertencentes ao Terceiro Setor, mais antigas de Portugal. Estas recebem contribuições financeiras significativas anuais do Estado pela resposta social (lar de idosos) que desenvolvem. O estudo é desenvolvido em duas fases. Na primeira fase foram calculados os scores de eficiência através da técnica não paramétrica Data Envelopment Analysis (DEA). Na segunda fase foi utilizada a regressão Tobit para verificar o efeito que certas variáveis organizacionais detêm na eficiência, nomeadamente o número de utentes e a existência de cadeias de lares de idosos. Os resultados do modelo DEA mostraram que a eficiência média foi de 81,9% e que apenas 10 lares de idosos foram eficientes. A regressão Tobit mostrou que o número de utentes tem um efeito positivo na eficiência dos lares de idosos, ao passo que a existência de cadeias de lares de idosos afeta negativamente a eficiência.

Palavras-chave: Data Envelopment Analysis, Eficiência, Lares de Idosos, Terceiro Setor

Abstract

This study aims to evaluate the economic efficiency of Nursing Homes owned by 96 Santas Casas da Misericórdia (SCM) and the determinants that influenced their efficiency in 2012 and 2013. The SCM are the oldest non-profit entities, which belong to Third Sector in Portugal, that provide social services (nursing homes) and response, receiving significant financial contributions annually from the state, in order to fulfill that social work. The study is divided into two stages. In the first stage, the efficiency scores were calculated through the non-parametric Data Envelopment Analysis (DEA) technique. In the second stage, Tobit regression is used to verify the effect of certain organizational variables on efficiency, namely, the number of users and the existence of Nursing Home networks. The results of the DEA model show that the efficiency average is of 81.9%, and that only 10 out of 96 Nursing Homes are efficient. Tobit regression shows that the number of users has a positive effect on the efficiency of Nursing Homes, whereas the existence of Nursing Home networks affects their efficiency negatively.

Keywords: Data Envelopment Analysis, Efficiency, Nursing Homes, Third Sector

Resumen

Este estudio tiene como objetivo evaluar la eficiencia económica de 96 asilos de ancianos pertenecientes a las entidades Santas Casas de la Misericordia (SCM) y los factores que influenciaron su eficiencia en el 2012 y el 2013. Las SCM son las entidades sin fines de lucro más antiguas de Portugal, perteneciendo al Tercer Sector de la Economía. Estas reciben anualmente contribuciones financieras significativas por parte del Estado por la respuesta social (asilos de ancianos) que desarrollan. El estudio se desarrolló en dos fases. En la primera fase se calcularon los resultados de eficiencia a través de la técnica no paramétrica Data Envelopment Analysis (DEA). En la segunda fase se utilizó la regresión Tobit para verificar el efecto que ciertas variables organizacionales tienen en la eficiencia, en particular el número de usuarios y la existencia de cadenas de asilos de ancianos. Los resultados del modelo DEA han evidenciado que la eficiencia media fue del 81,9%, y que solamente 10 de los 96 asilos de ancianos fueron eficientes. La regresión Tobit mostró que el número de usuarios tiene un efecto positivo en la eficiencia de los asilos de ancianos, mientras que la existencia de cadenas de asilos de ancianos afecta negativamente a la eficiencia.

Palabras clave: Data Envelopment Analysis, Eficiencia, Asilos de Ancianos, Tercer Sector

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List of Abbreviations and Acronyms

CASES	Cooperative António Sérgio to Social Economy
DEA	Data Envelopment Analysis
DL	Decree Law
DMU	Decision Making Unit
EBIT	Earnings Before Interest and Taxes
EBITDA	Earnings before Interest, Taxes, Depreciation and Amortization
EQUASS	European Quality in Social Services
GVA	Gross Value Added
INE	Instituto Nacional de Estatística
IPSS	Private Institutions of Social Solidarity
ISO	International Organization for Standardization
ISS, IP	Instituto da Segurança Social, IP
LO	Legislative Order
LS	Legal Standard
RO	Regulatory Ordinance
SCM	Santa Casa da Misericórdia
USA	United States of America
VIF	Variance Inflation Factor

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Introduction

According to Eurostat (2017a) in 2013, the average old age dependency ratio of the 28 Member States of the European Union (the ratio between the number of persons aged 65 and over, the age when they are generally economically inactive, and the number of persons aged between 15 and 64) was 27.5, which means that there were 28 people over 65 for every 100 people in working age, 17% more than in 2001. In 2060, the prediction points to a ratio of 51,6 (88% more than in 2013) (Eurostat, 2017b). In 2013, Portugal was the fifth country of the 28 Member States with the highest ratio (29,4), surpassed by Sweden, Greece, Germany and Italy (Eurostat, 2017a). Between 2001 and 2013 there was an increase of 21%, and in 2001 Portugal was now the 9th Member State with the highest ratio (Eurostat, 2017a). Predictions for 2060 show that the ratio will continue to rise. In fact, Portugal will be the third Member State with the highest ratio (64,9), surpassed only by Latvia (65,7) and Greece (67,9) (Eurostat, 2017b).

The noticed growth of the elderly population in Portugal was followed by an increase in social responses targeted to this slice of the population, namely Nursing Homes, day care centers and home care services. In 2013, there were more than 7.000 social responses to elderly people, 47% more than in 2000 (GEP-MSESS, 2013). Firstly, the home care services were the social response that showed the greatest number of requests and evolution. In 2013, there were more than 2.500 home care services with a relative increase of 66% in relation to the year 2000 (GEP-MSESS, 2013). Secondly, the Nursing Homes registered up to 2500 social responses and an increase of 55% in relation to the year 2000 (GEP-MSESS, 2013). Given the predictions of the elderly population by 2060, it is easily concluded that the number of Nursing Homes will tend to increase. Thus, it is important that the public regulatory bodies, in this case Instituto da Segurança Social, IP (ISS, IP), keep track of the efficiency in the Institutions, making sure that they manage the assigned financial contributions in a proper way. This information is also relevant to the central management of the SCM and to the administration of the Institutions, since it allows the comparison between Nursing Homes' practices in the management of allocated resources, identifying efficient and inefficient units, as well as turning into a benchmarking tool. Finally, the performance of Nursing Homes is important to the users (as well as to their relatives) of the Institutions, as they want to know if their payments are properly applied, which ultimately will affect the image of the services provided by Nursing Homes. This study aims to evaluate the economic efficiency of Nursing Homes owned by SCM in 2012 and 2013. In this stage, the efficiency assessment is performed through the non-parametric technique DEA. Furthermore, it is important to know the determinants, namely the organizational factors, that influence their efficiency. This information is relevant for the regulatory bodies and institutions, since it enables solutions to be identified, in order to provide financial sustainability to the Institutions. In this stage, the Tobit regression is used to verify the influence of certain determinants on the economic efficiency, by investigating the influence of organizational variables such as the number of users of the entity, the integration in a network of Nursing Homes and the possibility of providing other social responses.

This study is organized according to the following scheme: Section 1 describes a theoretical framework which includes the relation between the growth of the elderly population and the social responses to this population. Section 2 presents a literature review on the evaluation of efficiency in Nursing Homes. Section 3 describes the Nursing Homes sector, introducing the case study. Section 4 explains the methodology based on the DEA method and the Tobit regression. Section 5 presents and discusses the obtained results. Finally, section 6 describes the conclusions and future research in the field.

I. Theoretical Framework

1.1. Evolution of the Portuguese Population

According to Instituto Nacional de Estatística and Pordata (2016), in 2013, 10.457.295 people lived in Portugal (Table1). In the coming years, the population will tend to decline (Instituto Nacional de Estatística, 2014). Predictions for 2060 indicate a reduction of nearly 2 million people, from 10.5 to 8.6 million (normal scenario). Consequently, demographic aging will continue to increase. Between 2001 and 2013 the population over 65 years of age grew 20%. The number of people over 65 in 2013 was 2.051.225, representing about 20% of the total population. In 2060, the predictions point to 3.043 million, in a normal scenario (35% of the total population). The Population Aging Index in 2013 was 136 elderly people per 100 young people. In 2060, within the normal scenario, it could reach the value of 307.

Other highlights are the working-age population and the average life expectancy. The renewal rate of the working-age population, which measures the relation between people who leave and enter the labor market, was, in 2011, around 94. This shows that for every 100 people leaving the labor market, only 94 enter it. In 2001, the index was "positive", 143, which shows that there has been a significant reduction. Regarding the potential sustainability index, which analyzes the ratio between the number of people in active age (between 15 and 64 years) and the number of people aged 65 or over, in 2011 it was 347, which means there were 347 people in active age for every 100 elderly people, while in 2001 there were 414.

Regarding the year 2013, both indexes continued to fall. The population renewal index was 86 and the sustainability index was 330. The expectations for 2060, in both indexes, remain "negative". In relation to the population renewal index, in 2060, the forecast points to a value of 72, within the normal scenario. Regarding the potential sustainability index, the predictions indicate the value of 141 in the normal scenario. Finally, the average life expectancy continues to increase. Between 2001 and 2013, the increase was approximately 3 years, namely 3,36 years for men and 2,58 for women. By 2013, the average number of years a person lived was 80, with 82,79 years for women and 76,91 years for men. The prediction for 2060 points to 84,21 and 89,88 years, respectively for men and women.

Table 1 - Summary Statistics Population

Statistics Population	Year			Year 2060 (Prediction)		
	2001	2011	2013	Normal Scenario	Optimistic scenario	Pessimistic scenario
Population	10.362.722	10.557.560	10.457.295	8.600.000	9.200.000	6.300.000
Elderly (more than 65 years old)	1.705.274	1.992.034	2.051.225	3.043.000	3.344.000	2.729.000
Proportion of population	16,46%	18,87%	19,62%	35,38%	36,35%	43,32%
Population Aging Index	102	128	136	307	287	464
Working-age Population Index	143	94	86	72	76	60
Potential Sustainability Index	414	347	330	141	149	111
Average Life Expectancy	77	80		87		
Men	73,55		76,91	84,21		
Women	80,21		82,79	89,88		

Source: Adapted from Instituto Nacional de Estatística and Pordata (2016) and Instituto Nacional de Estatística (2014)

From the data previously mentioned, it is possible to infer that in the coming years the Portuguese population will tend to decrease. At the same time, the elderly population will continue to increase as well as the average life expectancy, that is, the population that will remain in the country will be mostly elderly.

1.2. The Social Economy in Portugal

The social economy in Portugal, commonly known as the third sector, non-profit sector, solidarity economy, among others (Andrade & Franco, 2007) comprises the entities that follow the guiding principles included in article 5 of Portuguese Law n.º 30/2013 of May 8, namely:

> a) "The primacy of persons and social objectives;
> b) Free and voluntary membership and participation;
> c) The democratic control of the related organs by its members;
> d) Conciliation between the interests of members, users or beneficiaries and the general interest;
> e) Respect towards the values of solidarity, equality and non-discrimination, social cohesion, justice and equity, transparency, shared individual and social responsibility and subsidiarity;
> f) The autonomous and independent management of public authorities and of other entities outside the social economy;
> g) The allocation of surpluses to the pursuit of the goals of social economy entities according to the general interest, without prejudice to the specificity of the distribution of surpluses, proper to the nature and substrate of each constitutionally consecrated entity of the social economy."

The entities that make up the social economy are (article 4 of Portuguese Law n.º 30/2013 of May 8):

> "a) Cooperatives; b) Mutual associations; c) SCM; d) Foundations; e) Other Private Institutions of Social Solidarity (IPSS) not covered by the previous paragraphs; f) Associations with altruistic purposes that perform their work within the cultural, recreational, sport and local development; g) The entities covered by the sub-contractors community and the self-managed, integrated under the terms of the Constitution in the cooperative and social sector; h) Other entities with legal personality, which respect the guiding principles of the social economy ... ".

According to the Social Economy Satellite Account, developed by Instituto Nacional de Estatística (INE) and Cooperative António Sérgio to Social Economy (CASES) (2013), in Portugal, in 2010, there were 55.383 social economy entities, wherein the legal nature of Association was the most represented form (94%), followed by the Cooperative form (4,1%).

Table 2 - Number of Entities of the Social Economy by Legal Nature

	Cooperatives	Mutual Associations	SCM	Foundations	Associations	Total
Number	2.260	119	381	537	52.086	55.383
Proportion	4,1%	0,2%	0,7%	1,0%	94,0%	100%

Source: INE and CASES (2013)

The following Table 3 shows the main economic indicators of social economy. The sector accounts for 5,5% of total paid employment, 2,8% of Gross Value Added (GVA) and 4,6% of remuneration. In addition to the Associations, which were the entities possessing the greatest influence on results, Cooperatives, SCM and Foundations also played an important role, albeit in a smaller number.

Table 3 - Economic Indicators of the Social Economy

	Coope.	Mutual Assoc.	SCM	Foundations	Associations	Total Economy	Social Economy (% Total)
Number	2.260	119	381	537	52.086	-	
Gainfully Employed	31.783	4.537	32.493	10.604	146.630	4.138.163	5,50%
GVA (10^3€)	747.162	332.249	518.301	361.073	2.301.546	151.413.479	2,80%
Remuneration (10^3€)	657.269	176.244	426.939	215.124	2.480.158	86.813.942	4,60%

Source: INE and CASES (2013)

As for the developed activities, most of them took place in the area of culture, sports and recreation, representing about 50%, followed by cults and congregations (13,8%) and social action (14,0%).

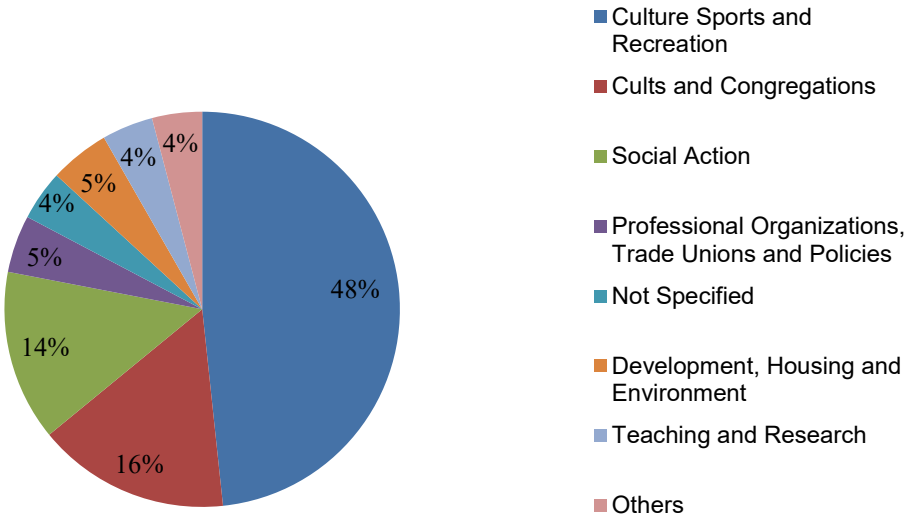

Illustration 1 - Area of Developed Activities by Entities of the Social Economy

Source: INE and CASES (2013)

1.3. The Private Institutions of Social Solidarity

The IPSS are nonprofit collective persons, with the "purpose of giving organized expression to the moral duty of justice and solidarity, contributing to the realization of the social rights of the citizens, not administered by the State or another public body" (nº 1 of article 1 of the Decree Law (DL) n.º 172-A, of 14th November). The objectives mentioned in the previous article are mainly for the provision of services in various areas, namely in the social support to the elderly, disabled people, social support to children and youth, among others (article 1-A from DL n.º 172-A of 14th November). Institutions that can acquire the IPSS status are Social Solidarity Associations, Mutual or Mutual Aid Associations, Social Solidarity Foundations, SCM and other institutions linked to the Catholic Church (article 2 of DL nº 172-A, of 14th November).

The fact that an institution holds the IPSS Status provides a special relation with the State. In fact, the State supports these institutions through cooperation agreements, which basically correspond to financial contributions granted by the ISS, IP to users who are covered by the agreements. In addition, they have other privileges, including tax exemptions in several taxes (Corporate Income Tax, Value Added Tax, among others) (Marques, 2010).

Regarding the existing number of IPSS in Portugal, in 2010 there were around 5.000 entities (Table 4). The majority of IPSS had the legal form of Association, followed by SCM, Foundation, Mutual Association and Cooperative. Social action was the most developed area of activity (64%), followed by cults and congregations (20%) and culture, sports and recreation. In the case of the SCM there is a clear predominance of social action as the most performed activity (94%).

Table 4 - Number of Private Institutions of Social Solidarity

	Coope.	Mutual Assoc.	SCM	Foundations	Associations	Total	(%)
Number	117	119	342	209	4.235	5.022	100,0%
(%)	2,3%	2,4%	6,8%	4,2%	84,3%	-	-

Source: INE and CASES (2013)

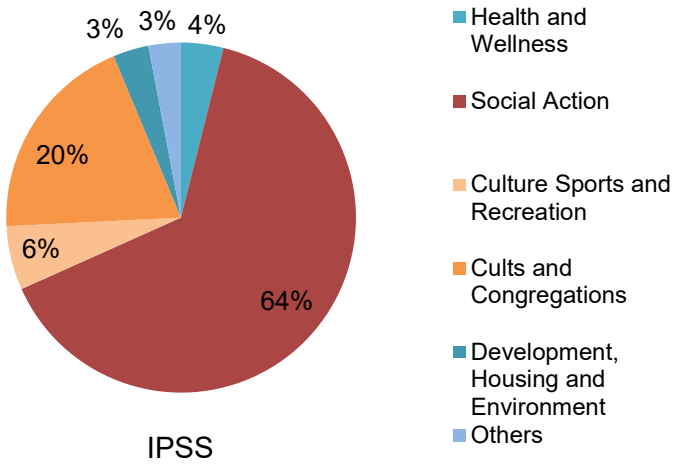

Illustration 2 - Area of Developed Activities by Private Institutions of Social Solidarity

Source: INE and CASES (2013)

1.4. Social Response in Portugal

As previously seen in the elderly population framework, over the last decade there has been an increase, representing, in 2013, about 20% of its population. In addition, future predictions indicate a relatively significant growth, and within the normal scenario the elderly people will represent about 35% of the Portuguese population. Associated with the elderly population is, of course, the role of social responses for the elderly, namely the Nursing Homes. Thus, some numerical data on social responses in Portugal is shown below.

According to the GEP-MSESS (2013), the social responses for elderly people in 2013, namely day care centers, Nursing Homes, home care services, among others, were the social responses that third sector entities developed the most, representing more than 50% of total social responses.

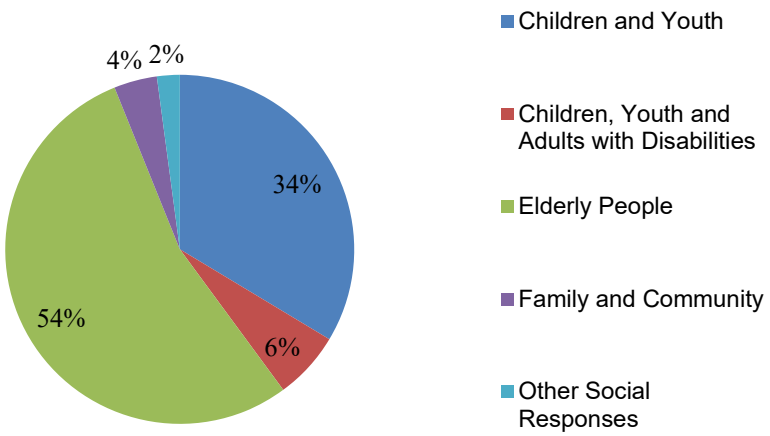

Illustration 3 - Social Responses by Target Population in 2013

Source: GEP-MSESS (2013)

In relation to the number of social responses and the evolution of the elderly people, in 2013 there were more than 7.000 social responses, 47% more than in 2000. Comparing, social responses for children and youth were close to 5.000 (+ 23% than in 2000) and in the remaining social responses the number was less than 1.000.

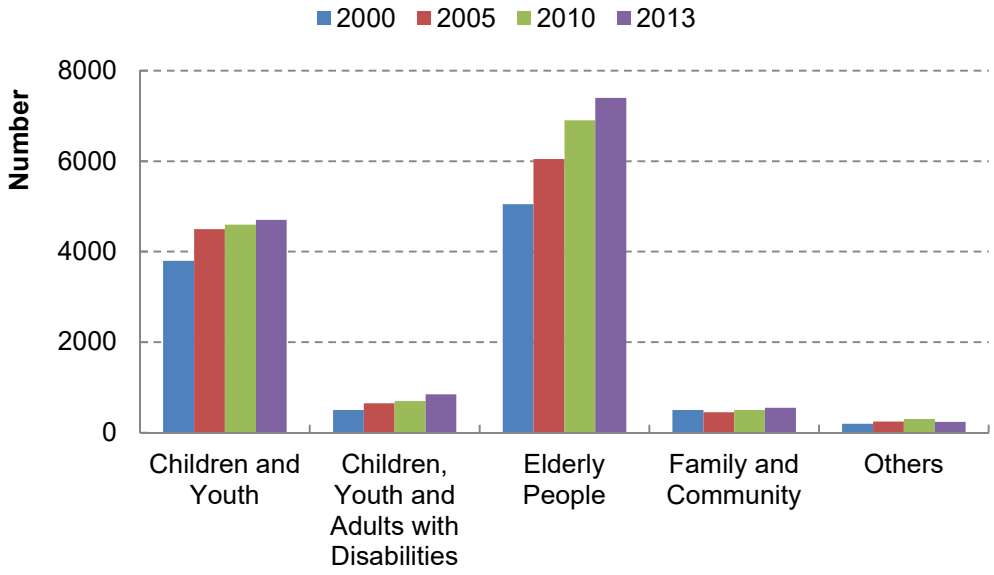

Illustration 4 - Number of Social Responses by Target Population within the Period 2000-2013

Source: GEP-MSESS (2013)

The following bar chart shows the number and evolution of four social responses for the elderly people. The home care service was the social response that showed the greatest growth and evolution. In 2013, there were more than 2.500 social responses, with a relative increase of 66%

over the year 2000. Also, the Nursing Home field registered close to 2.500 social responses and a 55% increase in relation to the year 2000.

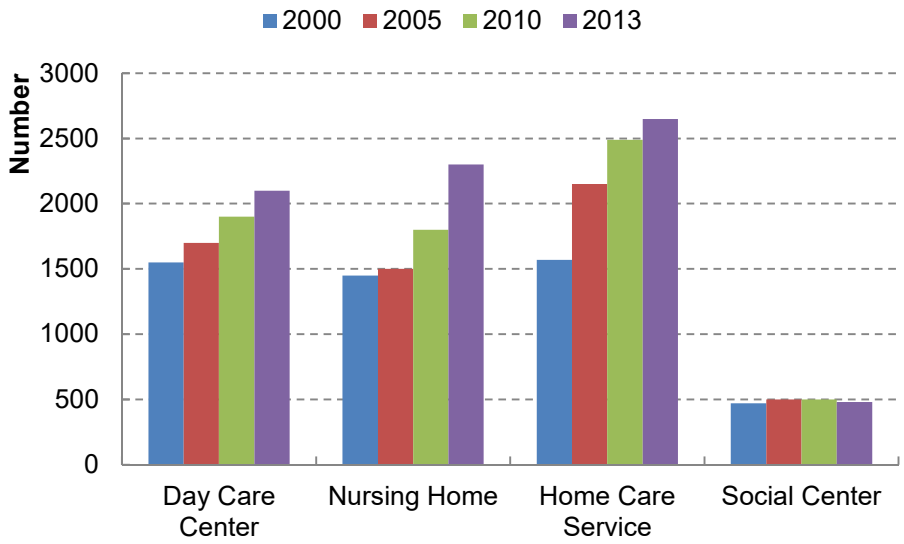

Illustration 5 - Evolution of Social Responses for the Elderly for the Period 2000-2013

Source: GEP-MSESS (2013)

From the data previously shown on the evolution of social responses for the elderly people between the years 2000 and 2013, it is easily inferred that it "follows", for the same period, the evolution of the elderly population. That is to say, at the same time there was an increase in the elderly population and in social responses for this target population, simultaneously. Given the predictions for the elderly population by 2060, which predict an increase of 1 million elderly people within the normal scenario, corresponding to 35% of the total population, it is also easy to conclude that the number of social responses will tend to increase.

1.5. Quality in Organizations

1.5.1. Quality Concept

The concept of quality is subjective. That is to say that, as an example, the same product or service, as well as their quality, can be perceived and assessed differently by each person (Rocha, 2010). Nevertheless, there are several definitions of quality. In the following Table 5, a set of definitions about quality is shown.

Table 5 - Quality Definitions

Deming (1998)	Quality is a multidimensional feature which has primary focus on customer satisfaction
Associação Portuguesa para a Qualidade	“Quality is the totality of characteristics of a product or service that determine its suitability to satisfy a given need”
NP EN ISO 8402:1997	"Company culture that allows providing products and services able to satisfy the needs and expectations of the clients"
DL n.º 166-A/99 of May 13th	"Management philosophy that allows for greater effectiveness and efficiency of services, less bureaucratization and simplification of processes and procedures, as well as the satisfaction of the explicit and implicit needs of the citizen"
NP EN ISO 9000:2000	"Quality is the degree of satisfaction of requirements given by a set of intrinsic characteristics"

Source: Adapted from Rocha (2010)

From the several definitions of quality mentioned above, there is a common denominator of customer satisfaction in relation to the service / product provided, that is to say, quality corresponds to customer satisfaction (Carpinetti, Miguel & Gerolamo, 2008).

1.5.2. Quality Management Systems in Third Sector Entities

The development of international trade, which occurred between the twentieth and twenty-first century, caused the implementation of international standards to ensure a standardized quality of products and services (ISO Central Secretariat, 1997). In this sense, in 1947, the International Organization for Standardization (ISO) was created, and since then it has published several standards in a number of areas of activity.

The ISO 9000 family is related to the implementation of quality systems in the organization. ISO 9000 Standards branch out into the following (Pinto & Soares, 2010):

a) NP EN ISO 9000:2005 - Quality Management Systems. Fundamentals and Vocabulary;
b) NP EN ISO 9001:2008 - Quality Management Systems. Requirements.
c) NP EN ISO 9004:2004 - Quality Management Systems. Guidelines for Performance Improvement;
d) NP EN 19011:2003 - Guidelines for audits of quality management systems and / or environmental management.

ISO 9000 standards are governed by eight quality management principles. In section 0.2 of NP EN ISO 9000:2005 the eight principles that can be used by the organization to improve its performance are identified:

> “a) **Customer focus**: Organizations depend on their customers and therefore must understand their current and future needs, meet their requirements, and strive to exceed their expectations;
> b) **Leadership**: leaders establish unity in the purpose and orientation of the organization. They should create and maintain an internal environment that allows the full involvement of the people in order to reach the objectives of the organization;
> c) **Involvement of people**: people at all levels are the essence of an organization, and their full involvement allows their skills to be used for the benefit of the organization;
> d) **Process approach**: a desired result is achieved more efficiently when the activities and associated resources are managed as a process;
> e) **Management approach as a system**: identifying, understanding and managing interrelated processes as a system contributes to the organization achieving its objectives effectively and efficiently;
> f) **Continuous improvement**: continuous improvement of an organization's overall performance should be a permanent goal of that organization;
> g) **Approach to fact-based decision-making**: effective decisions are based on the analysis of data and information;
> h) **Mutually beneficial supplier relationships**: an organization and its suppliers are interdependent, and a mutually beneficial relation enhances the ability of both parties to create value.”

In NP EN ISO 9001:2008 (Instituto Português da Qualidade, 2008), known as the reference standard, the necessary requirements to implement a quality management system are established. The standard is based on four pillars: a) Quality management system; b) Management responsibility; c) Resource management; d) Realization of the product; e) Measurement, analysis and improvement. In each of these dimensions there is a set of parameters that organizations must take into account in order to obtain quality certification. Thus, the standard requires the organization to guarantee a "product/service that meets applicable customer, statutory and regulatory requirements" and "customer satisfaction through effective system application, including processes for continuous system improvement and ensure compliance with applicable customer, statutory and regulatory requirements." The ISO 9001:2008 certificate is obtained through the evaluation of an external entity classified for this purpose and is valid for three years, and maintenance audits are held, with annual or semiannual intervals.

Also worthy of note is the European Quality in Social Services (EQUASS) certificate, that is applicable to entities that carry out activities in the social sector, such as Nursing Homes. As in the ISO standards, the EQUASS certificate is governed by 10 principles of quality: a) Leadership; b) Human resources; c) Rights; d) Ethics; e) Partnerships; f) Participation; g) Scope; h) Results Orientation; i) Continuous improvement. In each of the quality principles there is a set of indicators

that are evaluated by the certifying entities (EQUASS, 2012). The EQUASS certificate is valid for two years, and can be valid up to three years if the organization obtains the classification of excellence (reference, year). In addition to the mentioned certificates, there is also the certificate of quality issued by ISS, IP The certificate is based on NP EN ISO 9001: 2000. However, in this case certification is voluntary. The certification period is valid for three years (ISS, IP, 2014).

The following Table 6 shows the nursing homes for elderly people that, in 2016, were certified ISO 9001: 2008, ISS, IP and EQUASS. It is verifiable that the number of nursing homes with a quality certificate is relatively low. Among the 2.381 units, only 244 had a quality certificate of some type, which is equivalent to a 10,2% share. The Nursing Homes belonging to non-profit entities were the ones that obtained more quality certificates. Regarding the type of quality certificate, ISO 9001: 2008 was the most assigned, followed by ISS, IP and EQUASS. It is important to highlight that some institutions held more than one certificate. In fact, 29 Nursing Homes were holders of ISO 9001: 2008 and ISS, IP, five Nursing Homes had ISS, IP and EQUASS certificates, three Nursing Homes obtained ISO and EQUASS certificates and three Nursing Homes had all the certificates simultaneously.

Table 6 - Nursing Homes with Quality Certificates in 2016

Profit Status	Number of Homes		ISO 9001:2008 or ISS, IP or EQUASS	ISO 9001:2008	ISS, IP	EQUASS
Profit	695	40	16,4%	30	10	6
Non Profit	1.686	204	83,6%	137	76	32
Total	2.381	244	10,2%	167	86	34

Source: GEP-MSESS (2016)

1.5.3. The Quality Assessment in Nursing Homes

According to the Institute of Medicine (2001), the quality of social and health care is defined as "the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge". Although the definition is widely accepted within the literature, it raises the problem of only considering health outcomes as the only quality indicator (Huston, 2003). In addition, quality perception may vary according to people, namely physicians and users (Huston, 2003). In other words, the quality of health and social care is a multidimensional concept (Vaarama et al., 2008), so its assessment must occur through several perspectives, namely by considering the points of view of the organization and the users (Bostick, Rantz, Flesner & Riggs, 2006).

The study developed by Donabedian (1988) is widely accepted by the scholars as a proper evaluation on the quality of health and social care (Vaarama et al., 2008). The quality of social care involves the evaluation of three dimensions: Structure; Processes; Results. Regarding the structure, it concerns the means necessary for the provision of services, in particular material,

human resources and financial power. The processes include the actions carried out by professionals towards the users, in order to contribute to the improvement of their health and well-being, namely establishing a diagnosis or recommending and applying a treatment. In relation to the results, they comprise the changes in the health status and satisfaction of the users, as well as an improvement on their assessment on the quality of the service. Thus, according to the author, the structure affects the processes that, in their turn, affect the results. Given that, the quality of social and health care includes the analysis of the relationship between these three dimensions. The theoretical model of Donabedian (1988), and over the years that followed, was updated with the introduction of new indicators, without neglecting the Structure-Process-Results relationship (Unruh & Wan, 2004). The most commonly used indicators in literature are shown in Annex I (Unruh & Wan, 2004).

The Donabedian (1988) Structure-Process-Results model serves as a basis for the inspections carried out by the Medicare and Medicaid programs on Nursing Homes in the United States of America (USA). The authorities assess aspects related to health and safety conditions. Regarding health conditions, the Institutions are evaluated according to 180 regulatory standards that include, among others, health treatments, users' needs assessment, environment, food, users' rights and quality of life, administration and management of medicines. In relation to safety conditions, aspects related to fire protection, namely the conditions of construction of the building (Medicare, 2016), are verified. When deficiencies or serious deficiencies are found in institutions, and when those irregularities have not been corrected in a timely manner, those entities may be penalized by regulatory authorities, in the form of fines, by denying reimbursement to the Nursing Home, by appointing a temporary administrator, among others (Medicare, 2016).

In Portugal, inspections are carried out by ISS, IP. Inspections can arise through proactive or reactive actions. In relation to proactive actions, at the beginning of each calendar year a list of entities is published, in which the inspection action will take place (n.º 3 from article 39 of Regulatory Ordinance (RO) n.º 196-A/2015 of 1st July). Entities are selected according to criteria established by the ISS, IP, namely the high risk of negligence. Reactive inspections are carried out when complaints are filed (CNIS, 2016). That is to say, there may be Nursing Homes that are not audited. In fact, by 2015, inspections were scheduled for 176 third sector entities (ISS, IP, 2016).

The objective of the inspective[1] action is to evaluate the following aspects: a) Facilities; b) Safety conditions; c) Food hygiene and safety; d) Conditions of hygiene and comfort; e) Human resources; f) Functioning of social response; g) Technical and administrative organization; h) Participation of users and their families (CNIS, 2016). The detection of any deficiencies may lead to the issue of warnings, suspensions, resolution of cooperation agreements (article 34 of RO 196-A/2015 1st July), and closure of Institutions, among other penalties (article 39 of RO 196-A/2015 of 1st July).

[1] Annex II shows the aspects analyzed in detail

In addition to the inspection actions carried out by ISS, IP, inspections are also carried out by the District Health Delegates. The inspections aim to analyze the hygienic conditions, namely food quality and conditions of organization, operation and installation. The survey is carried out once a year in entities that had been previously selected. When irregularities that could endanger the health of the users or collaborators are detected, a time frame and due date are established for the Institution to correct the deficiencies found, and subsequently a verification is held, in order to check if the infraction has been effectively corrected.

On the other hand, in the USA nursing homes involved with the Medicare and Medicaid programs are monitored at least once a year, and more than one inspection may occur during the year when, for example, anonymous complaints occur (Medicare, 2016). It is important to mention that in the USA, in 2014, all Nursing Homes were involved in the Medicare and Medicaid[2] programs, that is to say, all Nursing Homes were audited at least once that year, contrary to what happens in Portugal, where there may be institutions which, in a given year, are not subject to inspections of any type.

[2] According to the Centers for Medicare and Medicaid Service (2015), 15.634 Nursing Homes were enrolled in the Medicare and Medicaid programs, according to the U.S. Department of Health and Human Services (2016) that there were about 15.600 Nursing Homes in the USA

II. Literature Review on the Evaluation of Efficiency in Nursing Homes

The efficiency of Nursing Homes has been studied worldwide (Ozcan, 2008). It is widely accepted that non-profit Nursing Homes have less efficiency than profit Nursing Homes (e.g. Anderson, Weeks, Hobbs & Webb, 2003; Knox, Blankmyer & Stutzman, 2003; DeLellis, 2009). However, and concerning profit Nursing Homes, the financial and economic results appear as priorities. In what non-profit Nursing Homes are concerned, those aspects are contemplated in a secondary way, focusing on the quality of the services provided to users (Ben-Ner & Ren, 2008). Rantz et al. (1998) interviewed a group of individuals involved in the providing of care, such as administrators, nurses, regulators and other collaborators, posing them questions about the quality of care. The authors identified two models of Nursing Homes, one with good quality of care and the other with poor quality of care. In Nursing Homes with good quality of care, the main focus was on the satisfaction of users. In Nursing Homes with poor quality of care, the main focus is not defined, which may represent the financial survival of the Nursing Home and justify its financial results, regardless of the users' needs. As Ben-Ner and Ren (2008) found in non-profit Nursing Homes, the objective is to provide the highest quality of services to the users, regardless of the associated costs. This does not occur in profit Nursing Homes due to the fact that financial results prevail, consequently investing less money in the quality of the care provided (Li et al., 2013).

According to Hollingsworth (2003), who conducted a survey about the techniques used in the investigation of efficiency of medical care units (among which the equivalents to Nursing Homes), the author verified that the nonparametric DEA technique was the most used. According to the author, the use of efficiency scores as a dependent variable in Tobit regression has been increasingly used. The goal is to verify the influence that determinants have on efficiency. Two characteristics commonly used in regression, besides ownership status, are the number of users and the integration into a network of Nursing Homes (e.g. Nyman & Bricker, 1989; Anderson, Lewis & Webb, 1999).

Concerning the Nursing Home chains or networks, the relation with efficiency has led to mixed results. Anderson et al., (1999), Arling, Nordquist and Capitman (1987), Fizel and Nunnikhoven (1993) and Knox et al. (2003) found that Nursing Home chains affect efficiency positively. The fact that Nursing Homes are integrated into a chain can increase efficiency through the effect of scale economies, in particular by sharing resources (e.g. human resources such as nurses and doctors), which will lead to lower general and administrative costs (Anderson et al., 2003). In addition, Nursing Home networks move faster in the learning curve through the sharing and adoption of new information among Nursing Homes (Anderson et al., 2003). However, the increase in operational activity in Nursing Home chains is not always positive (Fizel & Nunnikhoven, 1993). In fact, a growing operational activity can increase maintenance costs and slow down the decision-making process, which ultimately can reduce efficiency (Jensen & Meckling, 1976). In the study by Anderson et al. (1999), Nursing Home chains were less efficient than independent Nursing Homes.

The explanation may lie in the size of the Nursing Homes, since they tend to waste resources on bureaucracies instead of benefiting from scale economies and the experience curve.

Regarding the relation between the efficiency of Nursing Homes and the number of users, Nyman and Bricker (1989); Rosko, Chilingerian, Zinn and Aaronson (1995); Ozcan, Wogen and Mau (1998); Anderson et al. (2003) concluded that the number of users influences their efficiency in a positive way. The scale economies explain, once again, the relation found between the average expenses with a smaller number of users, (Banaszak-Holl et al., 2002; Bazzoli & Chan, 2000), particularly with expenditures on human resources (Ozcan et al., 1998). This is a general literature review on the evaluation of efficiency in Nursing Homes, but this study focus on economic efficiency following Anderson et al. (2003).

In terms of performance assessment in Portuguese Nursing Homes, the regulatory authority (ISS, IP) possesses information originated from inspection reports on the quality of services in profit and non-profit Nursing Homes (Article 19 of RO n.º 67/2012 of 21st March) and the income statement of non-profit Nursing Homes (ISS, IP, 2015). In this case, the income statement includes the financial information for each non-profit independent Nursing Home or Nursing Home chain. Regarding non-profit Nursing Homes, and until 2014, this information is not available for public consultation in Portugal. Since 2015, non-profit Nursing Homes are bound to publish, once a year, this information on their website (n.º 2 of article 14-A of DL n.º 172-A/2014 of 14th November) but some of them do not fulfill this obligation. As far as we know, no study was published on the implementation of the DEA methodology in Portuguese Nursing Homes. In the next section, the Nursing Homes area will be contextualized, in order to introduce the case study.

III. Nursing Homes Case Study

3.1. The Nursing Homes in Portugal

Nursing Homes are institutions for collective accommodation, "for temporary or permanent use, in which social support activities and nursing care are provided" (nº 2 of article 1 of RO n.º 67/2012 of 21st March). The objectives of Nursing Homes are "to provide permanent and adequate services to the biopsychosocial problems of the elderly; to contribute to the stimulation of an active aging process; to create conditions that allow the preserving and encouraging of the intra-family relationship; to promote social integration" (article 3 of RO n.º 67/2012 of 21st March). The maximum capacity of Nursing Homes is of 120 residents, and the users of Nursing Homes, commonly, are persons over 65 years of age; however, in certain cases, persons under 65 years old may be admitted (articles 5 and 6 of RO n.º 67/2012 of 21st March).

According to the (GEP-MSESS, 2016) in Portugal there are currently 2 381 Nursing Homes managed by profit and non-profit entities, as shown in Table 7. The installed capacity sums to 93 373 beds and the total number of users is 85.569, which corresponds to an occupancy rate of 92%. About 70% of all Nursing Homes are managed by non-profit entities, and more than 80% of users are accommodated in these institutions. The occupancy rate in non-profit organizations is of 95%, while in profitable entities it is 79%.

Table 7 - Nursing Homes of Portugal, 2016

Sector	No. Entities	No. Nursing Homes	Nursing Homes (%)	No. Beds	% Beds	No. Users	% Users
Profit		695	29%	19.537	21%	15.519	18%
Non Profit		1.686	71%	73.836	79%	70.050	82%
Total: SCM and Nursing Homes	300	467	20%	26.645	29%	25.375	30%
SCM: Independent Nursing Homes	198	198					
SCM: Nursing Homes Chain	102	269					
Total		2.381	100%	93.373	100%	85.569	100%

In the non-profit sector, there are 300 SCM (out of a total of 358[3]) that manage 467 Nursing Homes, representing 20% of total Nursing Homes. There are 198 SCM that only have one Nursing Home (Independent Nursing Home) while the remaining SCM (102) hold more than one (chain of Nursing Homes). It is crucial to highlight that SCM owns more beds and accommodates more users than the total amount within the entire profit sector, which illustrates the importance of SCM in the Nursing Homes sector. The next section thoroughly explores the Particular Case of Nursing Homes owned by SCM.

[3] UMP (2017)

3.2. The Particular Case of Nursing Homes owned by SCM

The SCM entities are "associations recognized in the canonical legal system, with the purpose of satisfying social needs and practicing acts of Catholic worship, in harmony with their traditional spirit, guided by the principles of Christian doctrine and morality" (nº 1 of article 68 of DL n.º172-A/2014 of 14th November).

The activities carried out by SCM are commonly referred to as social responses. A social response shall be deemed to be the support services provided to persons and families, whose purpose is: "(1) To prevent and remedy situations of social and economic deprivation and inequality, social dependence and social dysfunction, exclusion or vulnerability; (2) The community integration and promotion of people and the development of their capacities; (3) Special protection for the most vulnerable groups, including children, young people, the disabled and the elderly" (article 3 from DL n.º 64/2007 of 14th March). Thus, the actions developed by SCM are divided in several intervention areas: a) Children and youth; b) Children, youth and adults with disabilities; c) Elderly people; d) Family and community; e) People with drug addiction; f) People infected with HIV/AIDS; g) People with mental disease; h) People in situation of dependency. In each of these areas there are several services provided for this specific population. For example, the area of elderly population includes: Host families for the elderly; Day care center; Night care center for elderly, Home care services and Nursing Homes. In the area of children and young people, the SCM provides services like kindergarten, preschool, after school activities center, children and youth households, among others (GEP-MSESS, 2013). In the case of SCM, and regarding the year 2016, the most dynamic areas were children/young people and the elderly. In fact, out of the total of 2.041 social responses involving the several intervention areas, 1.216 belong to the elderly people area and 684 are related to the children and youth area (GEP-MSESS, 2016).

In the specific case of Nursing Homes, adequate food services are provided to the needs of the users, as well as personal hygiene care, clothing treatment, hygiene of the facilities, socio-cultural activities, support in the users' daily life activities, nursing care, and access to health care, with the administration of medicines (article 8 of RO n.º 67/2012 of 21st March). The infrastructure of the Nursing Home is organized in 9 areas: a) Reception area; b) Management Area, technical and administrative services; c) Facilities for personnel; d) Activities area; e) Dining area; f) Accommodation area; g) Kitchen and laundry area; i) Nursing services area. The provision of services is ensured by the staff of the institution 24 hours a day. In addition, each Nursing Home is obliged to comply with the staff ratios per user, illustrated in Table 8 (article 12 of RO n.º 67/2012 of 21th March). In case the user is in a situation of major dependence, each entity has to change the ratios of nurses, auxiliary nurses and assistant employees to 1/20, 1/5 and 1/15, respectively.

Table 8 - Staff Ratios per User

Staff	Schedule	No. Utentes
Social Worker	Part-Time	40
Nurses	Full-Time	40
Auxiliary nurse	Full-Time	8
Auxiliary nurse- Night Schedule	Full-Time	20
Housekeeping Clerk	Full-Time	>= 20
Chief Cook	Full-Time	By Nursing Home
Assistant Cook	Full-Time	20
Assistant Employee	Full-Time	20

The operational activity of each SCM is regulated by ISS, IP. The cooperation agreements are established between the IPSS and ISS, IP (n.º 4 of Legal Standard (LS) I of Portuguese Legislative Order (LO) 75/92 of 20th May). The agreements aim to achieve "the pursuit of actions by the institutions aimed at supporting children, young people, the disabled, the elderly and the family, as well as preventing and remedying situations of lack, dysfunction and social marginalization and the development of communities to enable social integration and promotion." (LS III of LO 75/92 of 20th May). The conclusion of cooperation agreements implies the allocation of financial contributions by ISS, IP. The allocation of the contributions is made by the user and varies according to the social response. Commonly, the conclusion of cooperation agreements occurs when a social response is held, for example the opening of a Nursing Home. To illustrate an example, let's think of a Nursing Home that includes 60 beds. Only a part of these 60 beds are covered by the cooperation agreement.

The purpose of the contributions is to "subsidize the running expenses of the equipment or services" (n.º 2 of LS XXII of LO 75/92 of 20th May). The amount of contributions granted by the ISS, IP are defined, annually, by the Protocol of Cooperation established between the ISS, IP and the representative organizations of the non-profit sector (União das Misericórdias Portuguesas, Confederação Nacional das Instituições de Solidariedade and União das Mutualidades Portuguesas) (n.º 4 of LS XXII of LO 75/92 of 20th May). In 2012 and 2013, the value granted by the Nursing Home cooperation agreement was €351,83 and €355,0 per user and per month, respectively. This monthly financial contribution may be subject to variations, within the following cases (MSSS and UMP, 2012; MSSS, UMP, CNIS & UMP, 2012):

- For users who are in a situation of dependency, the amount of € 65,35 (in 2012) and € 65,94 (in 2013) should be added.

- When the frequency of elderly people with dependency is higher than 75%, there is a complementary contribution of € 45,78 (in 2012) and € 46,19 (in 2013). The dependency

situation is proven through a medical statement, in which must be stated the type of care that is required, subject to review by the responsible services of the ISS, IP.

- If the vacancies are filled out by the competent services (namely the ISS, IP), the financial contribution of the ISS, IP is determined by the difference between the value of €869,91 and the sum between the user's contribution and their descendants or other legitimate heirs.

- If the vacancies are filled out and it is necessary to accommodate new users, the ISS, IP may resort to institutions in the frame of the non-profit sector. If there is no availability in the non-profit sector, ISS, IP will require the services of institutions in the profitable sector. The financial contribution, in these situations, is of €578,00 per user (in 2012), plus the contribution of the user's family (in 2013 the value was €583,20).

In addition to the financial contribution granted by the ISS, IP, the IPSS can receive payments from users and their families. The contributions of the users are submitted to the application of a rate (maximum limit 85%). This rate is defined internally by the Institution and should be proportional to the per capita income of the household (DGSS, 1997), taking also into account the economic and financial capacity of the users and their descendants.

Therefore, the main source of IPSS income includes the sum of the following amounts: payments from users and family descendants plus the contributions granted by the ISS, IP. It is important to note that, for users who are covered by a cooperation agreement, there is a limit of income that the Institution may receive. The limit corresponds to the product of the reference value per user, by the number of users in a cooperation agreement, plus 15%. For example, a Nursing Home with 60 beds covered by a cooperation agreement, the annual sum from 60 users could not exceed € 770.089,68 [(938,43 x 60 x 12) x 115%] in 2012 and € 777.020,04 in 2013. The reference value per user is set, each year, by the ISS, IP and the representative organizations of the Institutions. The reference value was of €930,06 and €938,43 in 2012 and 2013, respectively.

3.3. Comparison between Financial Indicators of Nursing Homes belonging to Santas Casas da Misericórdia and Profit Entities in 2013

The following Table 9 shows, among other factors, several financial indicators from the Income Statement of the SCM under study, and other Profit Entities[4] per user. The number of SCM with two or more Nursing Homes in 2013 was 35. Among profitable entities, although no information is available for 2013, in 2016 only seven entities had more than one Nursing Home, so it can be inferred that in 2013 the number of Nursing Homes was almost constant. The same occurs with the

[4] Profit entities were selected from the SABI database

number of users. Given that, we can also assume, with due reservations, that the number of users was similar in 2016.

Observing the indicators presented, it can be seen that the profitable entities had Sales, Costs of Goods Sold and Consumed, Earnings before Interest, Taxes, Depreciation and Amortization (EBITDA) and Earnings Before Interest and Taxes (EBIT) higher than SCM. Conversely, they had less Personnel Expenses and Net Profits. Only in two indicators, Costs of Goods Sold and Consumed and EBIT, there were no statistically significant differences.

Table 9 - Comparison between Financial Indicators

		SCM	Standard Deviation	Profit Entities	Standard Deviation	*(P-Value)* Test-T
	Number of Entities	96		267		
	Number of Nursing Homes	150		274		
	Average Nursing Homes	1,5	0,9	1,0		
Average per User	Users	85	47	27	15	
	Sales	6.620,0	1.406,3	13.106,5	8.180,4	**(<0,001)**
	Cost of Goods	1.486,6	734,5	1634,9	1.893,1	(0,445)
	Personnel Expenses	6.300,5	1.323,5	5799,1	2.715,9	**(0,019)**
	EBITDA	1.337,1	1.171,1	1720,1	2.415,6	**(0,042)**
	EBIT	593,5	1.224,7	692,8	1.944,4	(0,633)
	Net Profit	583,8	1.321,9	163,0	1.766,8	**(0,030)**

Analyzing the differences obtained by each indicator, in Sales, the differences found are explained by the contributions of the ISS, IP, organizational dimension and the lucrative status. That is to say, the high number of SCM users combined with the contributions they receive from ISS, IP ends up decreasing the value of Sales, whereas in profitable entities it increases, since they do not have the financial contribution of ISS, IP, and the number of users is lower than that of SCM. Regarding Personnel Expenses, the organizational dimension of the SCM explains, once again, the differences found. In fact, Nursing Homes are obliged to respect the staff ratios established in RO n.º 67/2012 of 21st March. Therefore, the larger the number of users, the more employees are needed. At last, and regarding the differences found in EBITDA and Net Profit, profit institutions have an higher EBITDA and lower Net Profit. The higher amount of EBTIDA is explained by the continuous nature of the profit, as well as by the reduced number of users. However, the net result of SCM is higher than that of profitable entities. This can be explained by the tax that profitable entities are subject to, due to the fact that, as is shown in Table 9, the EBIT of the SCM is practically identical to the Net Profit, whereas in the profitable entities there is a substantial reduction.

IV. Methodology

This study aims to evaluate the economic efficiency of Nursing Homes owned by SCM and the determinants that influenced that efficiency in 2012 and 2013. The study is divided into two stages. In the first stage, the efficiency scores were calculated through the non-parametric DEA technique. Only economic variables were used based on the Income Statement variables. In the second stage, a Tobit regression was performed to verify the effect of determinants on efficiency. The number of users, the number of social responses and the existence of Nursing Home chains or networks were the variables used. The information used in this study was collected from the ISS, IP and involves 96 SCM in 2012 and 2013, whose income statement was validated by ISS, IP until the third quarter of 2015. This financial information is only available for the entities themselves and the ISS, IP. In order to obtain the information about the institutions, diligences were established with the ISS, IP and only the information from the Nursing Homes administrated by SCM was obtained. Regarding the number of users, this information is available in the website developed by GEP-MSESS (2013), which is updated once a year. However, it is not possible to establish, for a given year, a match between the organizational characteristics of the profit Nursing Home, namely the number of users and its income statement, since their time reference has a lag of one year and the information related to previous years is not available in the website.

It is verifiable that the quality of the services provided by the Nursing Home is a major aspect in the management of the units. In the literature, there are many authors who use different aspects of quality (for example, users who received a flu vaccination, users with depression symptoms or weight loss) (DeLellis, 2009). These aspects are mostly based on inspections carried out by certified entities (for example, state entities) and by ISS, IP, in our case study. Globally, these quality assessment results are displayed to the public (e.g. Nursing Home Compare; Online Survey, Certification, and Reporting Systems), although this does not happen in Portugal. Specifically, the reports from inspection of Nursing Homes, carried out by ISS, IP, are not available for public consultation. It is important to mention that this information has already been requested to ISS, IP. However, it was not yet possible to obtain such information, hindering the study of the quality of the services provided by Nursing Homes. Within this study we assume that Nursing Homes meet the quality standards established by ISS, IP and it is *ceteris paribus*.

This study involves a sample of 96 (representing 32% of total Nursing Homes in 2016) Nursing Homes owned by SCM during the year 2012 and 2013, and their data is gathered from an income statement, after being validated by ISS, IP. Do note that the income statement for each SCM can include the data concerning one Nursing Home or consolidate the data concerning all Nursing Homes affiliated with the same chain/network. Thus, the SCM corresponds to the Decision Making Unit (DMU). Given that, the 96 SCM have 149 Nursing Homes in 2012 and 150 Nursing Homes in 2013 (one SCM opened a new Nursing Home in 2013), as summarized in Table 10.

Table 10 - Final Sample of Case Study

	2012	2013
Number of SCM	96	96
Number of Nursing Homes	149	150

4.1. Data Envelopment Analysis (1st Stage)

The DEA technique, initially introduced by Charnes, Cooper and Rhodes (1978), enables to assess the relative efficiency of homogenous organizational units, Decision Making Units (DMU), which use multiple inputs to produce multiple outputs. Considering the input orientation, the efficiency value of each DMU is calculated through the ratio between inputs of the efficient unit producing similar outputs to the evaluated unit over the inputs of this unit (Banker, Charnes & Cooper, 1984). In the case of the DMU using multiple inputs to produce multiple outputs, the DEA technique assigns weights in order to maximize the ratio obtained, subject to the restriction that all DMUs, for the same set of weights, hold a maximum value of 100% (Banker et al., 1984). Thus, the DEA technique identifies the border of the set of production possibilities (PPS) defined by the efficient DMUs and the segments that connect them. The remaining DMUs are inefficient, being evaluated by reference to the obtained border.

Consider a set of n Nursing Homes named by $j(j = 1, \dots, n)$ that use m inputs $x_{ij}(x_{1j}, \dots, x_{mj}) \in R_+^m$ to obtain s outputs $y_{rj}(y_{1j}, \dots, y_{sj}) \in R_+^s$ .In the DEA model, input orientation was used, since Nursing Homes have more control over inputs than outputs (Ozcan, 2008). The relative efficiency of the Nursing Home$_0$ can be evaluated considering the border with variable returns to scale and the orientation of the inputs, using the linear programming model (1), obtaining an optimal solution, θ_0^*.

$$\min \{\theta_0 |\ \theta_0\, x_{i0} \geq \sum_{j=1}^{n} \lambda_j\, x_{ij}, i = 1, \dots, m;\ y_{r0} \leq \sum_{j=1}^{n} \lambda_j\, y_{rj}, r = 1, \dots, s;\ \sum_{j=1}^{n} \lambda_j = 1; \lambda_j \geq 0;\ \forall_{j,i,r}\} \quad (1)$$

The pure technical efficiency (θ_0^*) of Nursing Home$_0$ corresponds to the minimum factor with which all its inputs can be reduced, taking into account the obtained results. The efficiency measure will reach 100% when the evaluated Nursing Home$_0$ is considered efficient, while lower values will indicate the existence of inefficiencies. The variable that returns to scale frontier is considered, since there are evident differences in SCM size (Coelli, Rao, O'Donnell & Battese, 2005).

In the evaluation of efficiency, only economic variables were used based in the Income Statement. Since the Income Statement is composed of income and expenses, we used indicators of expenditure on inputs and income on outputs. It was decided to aggregate the variables of expenditures and income with the aim to reflect that efficient entities had positive net results. Bearing in mind this perspective, the DEA model is constructed using two inputs (Operational Expenses and Other Costs) and a single output (Total Revenue). Operating Expenses include

Costs of Goods Sold and Consumed, External Supplies and Services and Personnel Expenses. Other Costs include, namely, other expenses related to expenses with depreciation and losses in inventories. It was considered a single output (Total revenue) resulting to the income of each unit, i.e. Sales (user and family payments), Subsidies received from the ISS, IP, and other subsidies (e.g. European Community funds and national programs' funds for non-profit institutions). It is relevant to highlight that the choice of the previous variables was restricted by the available information obtained from ISS, IP.

Table 11 shows the averages, coefficients of variation, maximum and minimum values of the inputs and output used. There is a large discrepancy in the data (a coefficient of variation of more than 50% in Operating Costs and Revenues and over 100% in Other Expenses). This means that the size of Nursing Homes under analysis is quite different, as is also shown by maximum and minimum values.

Table 11 - Descriptive Statistics of Inputs and Output

	2012				2013			
(€)	Mean	C.V.	Max.	Min.	Mean	C.V.	Max	Min.
Operating Expenses	838.692,3	56,7%	2.401.267,3	137.748,9	864.356,8	56,6%	2.469.842,5	134.876,5
Other Costs	82.122,2	131,0%	911.463,0	9.208,1	79.410,1	126,7%	897.019,3	7.520,4
Total Revenue	897.167,8	57,1%	2.229.108,8	159.450,4	924.890,8	56,2%	2.282.380,7	138.586,1

4.2. Tobit Methodology

In the second stage, a Tobit regression is performed with three independent variables: (X_1) number of users; (X_2) existence of Nursing Home chains/networks (binary variable with value 0 if it has a single Nursing Home and value 1 otherwise); (X_3) number of social responses. The variables "number of users" and "existence of associated Nursing Homes affiliated with chains" are often used in efficiency studies (e.g. Nyman & Bricker, 1989; Anderson et al., 2003). Regarding the inclusion of the variable "number of social responses", the SCM can provide other services besides the Nursing Homes, such as Day Care Center and Home Care Service for the elderly, Kindergarten, Pre-school, among others. The Tobit regression is appropriate for this study due to the dependent variable; the efficiency score ranges from 0 and 1 (e.g. Fizel & Nunnikhoven, 1993; Kooreman, 1994; Wang & Chou, 2003; Garavaglia, Lettieri, Agasisti & Lopez, 2011; Iparraguirre & Ma, 2015). The regression model is presented in (2).

$$\theta_j = \propto + \beta_1 X_{1j} + \beta_2 X_{2j} + \beta_3 X_{3j} + \varepsilon_j \quad (2)$$

Where $\propto$ is the intercept, β_1, β_2 and β_3 are estimated coefficients of regression, ε_j is the error term $\varepsilon_j \sim N(0,1)$ and X_{1j}, X_{2j} and X_{3j} are the dependent variables, number of users, number of social responses and the existence of Nursing Home chains. This is a binary variable with value 0 if it is an independent Nursing Home, and value 1 otherwise. There are 61 independent Nursing Homes

and 35 Nursing Home Chains. Table 12 shows the descriptive statistics of independent variablesX_{1j}, X_{2j} and X_{3j}. A high variance, regarding all indicators, can be observed. This is symptomatic of the variability of the SCM dimension, as observed, for example, in the maximum and minimum of social responses, ranging from 1 to 53.

Table 12 - Descriptive Statitics of Variables used in the Tobit Regression

	2012				2013			
	Mean	C.V.	Max	Min	Mean	C.V.	Max	Min
Number of Users	83	54%	232	12	85	56%	244	12
Number of Nursing Homes	2	58%	5	1	2	59%	5	1
Number of Social Responses	10	80%	53	1	10	75%	53	1

As mentioned in literature, Nursing Home chains/networks can increase efficiency through economies of scale (Anderson et al., 2003). However, the reverse may occur due to management problems, such as resource wastage. The increasing firm size may cause higher monitoring costs and slow decision-making processes (e.g. Jensen & Meckling, 1976; Anderson et al., 1999). In addition, non-profit Nursing Homes focus on the quality of the care provided, and financial results are considered secondary (Ben-Ner & Ren, 2008). Given the Portuguese context, Nursing Homes must meet staff ratios for each Nursing Home (article 12 of RO n.º 67/2012 of 21st March). Thus, the opening of a new facility always includes the hiring of at least 8 people, so there is no possibility of rationalization of human resources. The same applies to other areas in which the SCM provides services, namely in the area of the elderly population and childhood and youth, home care services and kindergarten (it is compulsory to comply with the staff ratios established in RO n.º 67/2012 of 21st March). Moreover, Nursing Homes included in the analysis are non-profit, so the focus on quality is the main objective, which implies a greater consumption of resources. Therefore, it is expected that the variables “existence of Nursing Home chains” and “number of social responses” have a negative effect on efficiency. On the other hand, the number of users is expected to have a positive effect on efficiency due to the possibility to have economies of scale through the rationalization of resources, namely human resources, which reduces the average costs (Ozcan et al., 1998). Given that, there are three research hypotheses:

H1: The number of users has a positive effect on efficiency;
H2: The existence of Nursing Home chains has a negative effect on efficiency;
H3: The number of social responses has a negative effect on efficiency.

V. Results and Discussion

5.1. Efficiency Assessment of Nursing Homes (1st Stage)

In the first stage, the economic efficiency of a Nursing Home in a given year is estimated through the model (1), considering the best practices observed during 2012 and 2013. The results show that the average efficiency is 81,9% which means that each Nursing Home can reduce its expenses (inputs), on average, in 18,1%, given the level of revenues obtained. Ten (10) out of 96 Nursing Homes are considered efficient: 3 units were efficient in 2012, 6 were efficient in 2013 and only one was efficient in both years. These Nursing Homes are considered as benchmarks for inefficient Nursing Homes. The efficient Nursing Homes have different characteristics, namely in the organizational dimension. In fact, 5 are independent Nursing Homes and the other 5 are Nursing Home chains (2 chains are composed by 2 Nursing Homes, 1 chain is composed by 3 Nursing Homes, 1 chain is composed by 4 Nursing Homes, and 1 chain is composed by 5 Nursing Homes). The same occurs for the number of users, ranging from a minimum of 12 to a maximum of 244. Furthermore, the number of social responses within the corresponding SCM has also a large variance. There are 5 SCM with less than 10 social responses, 4 SCM with social responses ranging from 11 to 16, and one SCM with 43 social responses.

Globally, the average efficiency of independent Nursing Homes is 81,9% (standard deviation is 9%), while in Nursing Home chains the average efficiency is 81,8% (standard deviation is 12%) as shown by Table 13. In addition, there are 75 Nursing Homes that possess slacks in the input “Other Expenses”, and one with a slack in the input “Operating Expenses”. These SCM should reduce their expenses without affecting the provision of social services. Table 13 also describes, in detail, the average efficiency considering the different quartiles of the number of users per group of Nursing Homes.

Table 13 - Average of Efficiency of Nursing Home Chains and Independent Nursing Homes

	Independent Nursing Homes			Nursing Home Chains		
All DMUs	Efficiency	Standard Deviation	Users Range	Efficiency	Standard Deviation	Users Range
	81,9%	9,0%	12-150	81,8%	12,0%	51-244
First Quartile	83,0%	12,5%	12-43	77,7%	10,4%	51-87
Second Quartile	79,4%	6,9%	44-60	78,9%	13,5%	88-106
Third Quartile	78,0%	7,3%	61-76	81,9%	10,5%	107-153
Fourth Quartile	87,0%	7,4%	77-150	89,3%	8,4%	154-244

For independent Nursing Homes, no trend is found between efficiency and number of users. In fact, the average efficiency decreases in the second and third quartiles of users. In Nursing Home chains, there seems to be a positive association between efficiency and number of users. Indeed,

the efficiency has increased in all quartiles. The Tobit regression presented in next section will allow for more conclusive results in terms of the determinants of Nursing Homes performance.

5.2. Tobit Regression (2nd Stage)

In the second stage, the Tobit regression is used to verify the influence of organizational variables on efficiency. Specifically, we investigate the influence of organizational variables such as the number of users of the entity, the integration into a chain of Nursing Homes and the possibility of the entity to provide other social responses. The results are presented in Table 14, considering the goodness of fit of the model. The Variance Inflation Factor (VIF) for each independent variable does not present any problems of collinearity; and residues, according to the p = 0,658 value of the chi-square test, follow a normal distribution (the null hypothesis of the error distribution is not rejected). The Kolmogorov-Smirnov test was run for each variable and the results show that the independent variables do not follow a normal distribution. However, that does not present an obstacle due to the Central Limit Theorem, which justifies the asymptotic normality for large samples (n ≥ 30). Thus, the goodness of fit of the model is considered to be acceptable (Wooldridge, 2006).

Table 14 - Results of Tobit Regression

	Expected Sign	Coefficient	Standard Error	Z	P-Value	VIF
Intercept		0,774	0,016	48,08	<0,001	
Number of Social Responses	-	-0,001	0,001	-0,70	0,486	1,324
Integration into a Chain of Nursing Homes	-	-0,040	0,019	-2,04	0,041	1,761
Number of Users	+	0,001	0,000	4,11	<0,001	1,568

The Tobit regression shows that the number of users and the existence of Nursing Home chains are statistically significant. The chain affiliation of Nursing Homes negatively affects efficiency. The results confirm the conclusions of Anderson et al. (1999). That is to say, that Nursing Home chains have lower efficiency than independent Nursing Homes. According to what Anderson et al. (1999) concluded, the greater size of the entities may make it difficult to manage them. The non-profit status and compliance with staff ratios explain the differences found. Given the fact that the Nursing Homes in question are non-profit, the focus is on the quality of care provided to the users, which leads to a greater expenditure of resources. Since Nursing Homes have to meet staff ratios for each Home, with at least 8 employees, entities that have more than one Nursing Home, in turn, are forced to hire more staff. In that sense, there is no possibility of rationing human resources, which will lead to an increase in expenses, causing difficulties in the management of Nursing Homes. On the other hand, the number of users positively affects efficiency. The results are in compliance with literature (e.g. Nyman & Bricker, 1989; Rosko et al., 1995; Ozcan et al., 1998),

which mentions that the greater the number of users, the more efficient the Nursing Homes are, due to the economies of scale. Nursing Homes can benefit from lower average costs, namely on human resources, food and energy. It is interesting to note that the fact that an SCM has more than one Nursing Home does not mean that it is more efficient than another SCM that only administrates one unit. Therefore, SCM are more efficient with only one Nursing Home, and with the largest number of users. In that sense, hypotheses H1 and H2 are validated.

Regarding the number of social responses of SCM, no statistical significance was obtained. However, the negative coefficient should be highlighted, which indicates that the number of social responses negatively influences efficiency, supporting the action of the regulatory authorities in allocating the social responses to each SCM. Furthermore, as SCM increases its social activities, the associated costs, such as human resources, also increase, which may hinder the management of activities. However, this hypothesis (H3) was not validated.

VI. Conclusions

The objective of this study is to assess the economic efficiency of non-profit Nursing Homes owned by SCM and the organizational variables that can influence their efficiency. In the first stage, a DEA model (1) is used to assess the efficiency of the Nursing Homes, considering the best practices observed during 2012 and 2013. In the second stage, a Tobit regression is used, using as the dependent variable the efficiency scores obtained from the DEA, and as independent variables the number of users, the existence of Nursing Homes chains and the number of social responses.

The DEA model showed that the efficiency average of the Nursing Homes is 81,9%, and that 10 out of 96 Nursing Homes are efficient. Furthermore, the efficiency average between independent Nursing Homes and Nursing Home chains is practically the same. It is important to highlight that there were 76 Nursing Homes which showed slacks in the inputs, so it is inferred that these entities should reduce their inputs without affecting the provision of social services.

The Tobit regression reveals that the number of users and the existence of Nursing Home chains are statistically significant, influencing their efficiency. The number of users has a positive effect, while the existence of a chain of Nursing Homes affects negatively their efficiency. This means that, although Nursing Homes can benefit from economies of scale by increasing the number of users (e.g. Banaszak-Holl et al., 2002; Bazzoli & Chan, 2000), when this increase implies the opening of a new Nursing Home, the fact may lead to difficulties in management, consequently reducing their efficiency (Anderson et al., 1999).

Regarding the limitations of the study, the non-use of qualitative variables, namely variables related to the quality of services provided, appears as the main limitation. Thus, in terms of future research within this field, it would be interesting verify the impact that certain aspects concerning the quality of social services have on the efficiency (e.g. safety conditions, hygiene and comfort conditions, food safety, among others). In addition, it would also be interesting to compare the results of the relationship between efficiency and quality of services among non-profit and profit Nursing Homes.

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Annexes

Annex I - Structure-Process-Results Indicators (Unruh & Wan, 2004)

Contextual and Structural Components of Nursing Home Quality
Characteristics of population (% aged; % females; % white)
Population health status
Per capita or median income of the county
Location: urban versus rural, region and state
Market competition (County Herfindahl Index)
Supply of nursing homes
Regulatory constraints (CON, BBA)
Medicaid, Medicare, private reimbursement type and rate

Organizational Factors/Facility Characteristics
Size of beds
Ownership
Chain affiliation
# of Medicaid days
Payment mix
Case mix
Certification status
Average ADLs of residents
% of skilled nursing professionals in a nursing home
Registered nurses per 100 residents
Licensed practical nurses per 100 residents
Nurse assistants per 100 residents
RN-nurses' ratio
Nurse hours per 100 residents
NA training
RN, LPN, NA proficiency
Nursing Administration

Nursing Process Components of Nursing Home Quality
Comprehensive resident assessment
Assessment upon condition change
Assessment review
Accuracy of assessments
Development of comprehensive care plan
Meeting of care plan requirements
Sufficient and appropriate nursing care

Specific nursing care:

Minimal restraint use
Residents are treated with dignity and respect
Absence of abuse
Facility is free of accident hazards
Facility is clean and home-like
Maintenance of daily activities for the residents
Treatment to improve the abilities of residents
Appropriate treatment to residents with limited range of motion
Lack of training, skill practice, or range of motion for mobility-dependent residents
Minimal use of urinary catheter
Treatment for bladder incontinence
Minimal use of NG tube
Proper care of nasogastric tubes
Appropriate usage of medication
Appropriate treatment for mental or psychosocial problems
Treatment to ensure an healthy hearing and vision
Corrective action for sensory or communication problems
Treatment for pressure sores
Foot care for insulin-dependent diabetic residents

Outcome Components of Nursing Home Quality (Resultados)
To be free from physical restraints
To engage in ongoing activities that fit the resident's profile
To be able to choose activities, schedules, interact with members of community, and make choices about aspects of their life in the facility
To be free from verbal, sexual, physical and mental abuse, corporal punishment, and involuntary seclusion
Prevention of injuries
Prevention of falls/tumbles
To have a safe, clean, comfortable and homelike environment
To have individual needs and preferences satisfied
Prevention of bedfast residents
Incidence of contractures
Prevention of indwelling catheters
Prevention of bladder or bowel incontinence
Prevention of bladder/bowel incontinence without a toileting plan
Prevention of infections of the urinary system
Prevention of fecal impaction
Prevention of tube feeding
To have acceptable nutritional status
To have proper hydration
Prevention of weight loss
Prevention of dehydration
Prevention from unnecessary drugs
Prevention of significant medication errors

Prevention of chemical restraint for purposes of discipline or convenience
Prevention of antipsychotic use in the absence of psychotic and related conditions
Prevention of antipsychotic daily dose > guidelines
Prevention of antianxiety or hypnotic use
Prevention of hypnotic use on a scheduled basis or p.r.n. more than two times in the past week
Prevention of the use of antibiotic and anti-infective medicines
Use of 9 or more scheduled medications
Prevention of behavior problems towards others
Prevention of depression symptoms
Prevention of depression symptoms, with no treatment
Incidence of cognitive impairment
Prevention of stage 1 to 4 pressure ulcers

Annex II - Aspects analyzed by Instituto da Segurança Social, I.P[5].

1 - Identification
Name of Entity
Predicted Capacity
Number of Covered Users
Frequency Users at the time of inspection

2 - Facilities
Organic Structure
Description of physical spaces and their suitability to users where the social response analyzed is developed, whenever possible using images (preferably giving account of deficiencies or changes in the functionality of spaces, not authorized by Social Security)
Appreciation
During the visit, were there any significant deficiencies in the state of conservation?
During the visit, did constraints on the accessibility of disabled people were observed?
During the visit, were there any changes in the functionality of the spaces?
During the visit, was the inadequacy of the facilities verified against the established requirements?

3 - Safety Conditions
Usage License
Is there a License or authorization issued by the Municipality to use the Facilities?
Fire Safety
Is there a Certificate of Fire Safety, issued by ANPC?
Have the Self-Protection Measures been prepared and presented for consideration by the ANPC?
Are there fire extinguishers? Are they within the expiration date?
Are there fire warning signs?
Is there emergency lighting?
Are there automatic fire detectors?
Is there a central signaling and command?
Are the emergency exits with openings to the outside marked and unobstructed?
Are the conditions of access and evacuation fast and easy to perform in the event of an emergency?
Hygienic Conditions
Is there an Inspection Order/Health Certificate issued by the Health Authority?
Other Safety Conditions
Is there a Certificate of Inspection for gas installations issued by an accredited entity?
Is there a periodic inspection certificate issued by accredited entities?
Have there been no significant deficiencies in the conservation of electrical installations?

[5] The denomination of the variables is done according to the CNIS (2016)

Is there an adjustable, non-toxic and protected access heating system?

4 - Food Security

Does the organization comply with food safety and hygiene rules and procedures (HACCP)?

- Are liquid detergent dispensers and paper disposable wipes available?
- Are frozen products properly separated and stored?
- Is there physical separation between cleaning materials and food supplies?
- Are the products stored within the validity deadlines?
- Are the facilities in good condition and cleanness?
- Does the configuration of the facility allow its different uses?
- Does the entity ensure the principle of traceability with sample collection?

5- Hygiene and Comfort Conditions

General conditions

Did the inspection detect any deficiencies in the conditions of cleaning, storage and ventilation of the facilities?

During the inspection, was the implementation of cleaning / sanitation plans with updated records verified?

Are the sanitary facilities equipped with dispensers of liquid soap and paper wipes, loaded and fit for use?

Did the inspection detect any deficiencies in the climatization conditions?

Did the inspection detect any deficiencies in lighting conditions?

Did the inspection detect deficiencies in the hot water supply?

Specific Conditions

Is disposable material used in the provision of hygiene care?

Are the toiletries cleaned, tidy and clean?

7 - Other Aspects

Services Available to Users

Is food service provided?

- Are there menus?
- Was the meal served consistent with the one mentioned on the menu?
- Is the food varied and adequate qualitatively and quantitatively according to the age of the children / the typology of users?
- Are there special diets on prescription?

Are there activities of leisure and occupation?

Is there a plan of activities?

Is there a cultural animator/social worker?

Is there personal care?

Is there medical assistance?

Is there any laundry service?

Does the period of operation of the social response ensure the fulfillment of what is defined in a cooperation agreement?

Have there been any situations of inadequacy or lack of care in meeting the needs of users?